CHAPTER 5
NATURAL RESOURCES ELEMENT

> *What are the natural features which make a township handsome? A river, with its waterfalls and meadows, a lake, a hill, a cliff or individual rocks, a forest, and ancient trees standing singly. Such things are beautiful; they have a high use which dollars and cents never represent. If the inhabitants of a town were wise, they would seek to preserve these things, though at a considerable expense…*
>
> Henry David Thoreau, Journal, 1861
> (Quoted in Dramstad, Olson, and Forman 1996)

The Natural Resources Element provides the City with the opportunity to inventory natural and environmentally sensitive resources; to consider the issues, problems and opportunities associated with those resources; and to develop goals, policies and strategies for their appropriate use, conservation and protection that are consistent with those established for other Plan elements.

An assessment of natural resources must be conducted to consider how they can most wisely and responsibly be utilized, developed, managed or preserved in order to yield maximum long-range benefits to the community. The assessment should also consider the potential vulnerability of the community's natural resources to land development and other human activities and evaluate whether protecting them is important to the future health and economic well being of the community. Levels of community support for conservation of various natural resources should also be considered.

The results of this assessment should be considered in the development of needs and goals and an associated implementation strategy that sets forth any special treatment or protection to be provided these resources over the planning period. Any strategies developed by local governments for the protection of the resources, where applicable, must specifically reference the Department of Natural Resources' Rules for Environmental Planning Criteria developed pursuant to O.C.G.A. 12-2-8.

This element consists of the Natural Resources Element adopted as part of the 2020 Comprehensive Plan, but various components are updated where necessary.

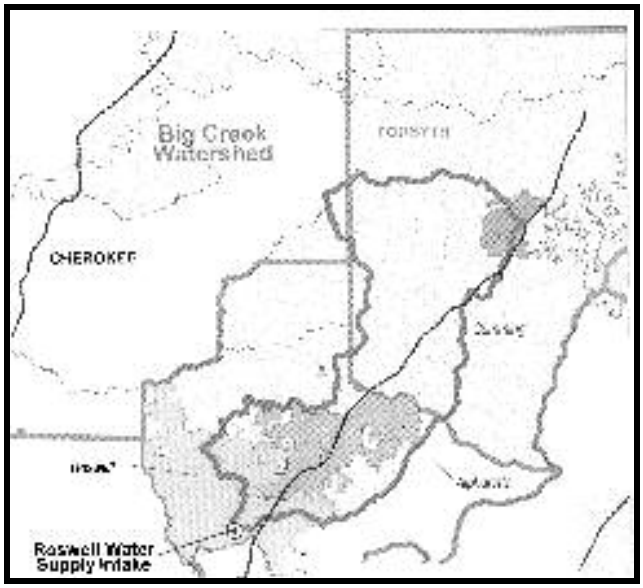
WATER SUPPLY WATERSHEDS

A water supply watershed is an area where rainfall runoff drains into a river, stream, or reservoir used as a source of public drinking water supply (Georgia Department of Community Affairs, n.d.). The Georgia Department of Natural Resources promulgated criteria for water supply watersheds (Rules of Georgia DNR 391-3-16-.01) in an effort to avoid the contamination of water sources to a point where they cannot be treated to meet drinking water standards. Such regulations can limit the amount of pollution that gets into the water supply and thus reduce the costs of purification and provide improved public health (Georgia Department of Community Affairs, n.d.). The City of Roswell currently has a water supply intake on Big Creek at Oxbo Road. The water supply watershed is classified by DNR rules as a "small" watershed (i.e., less

than 100 square miles). It should be noted that the Roswell Water Treatment Plant is proposed by the Metropolitan North Georgia Water Planning District to be decommissioned by 2030 (Source: Table 9-3, regional water plan).

Big Creek Water Supply Watershed

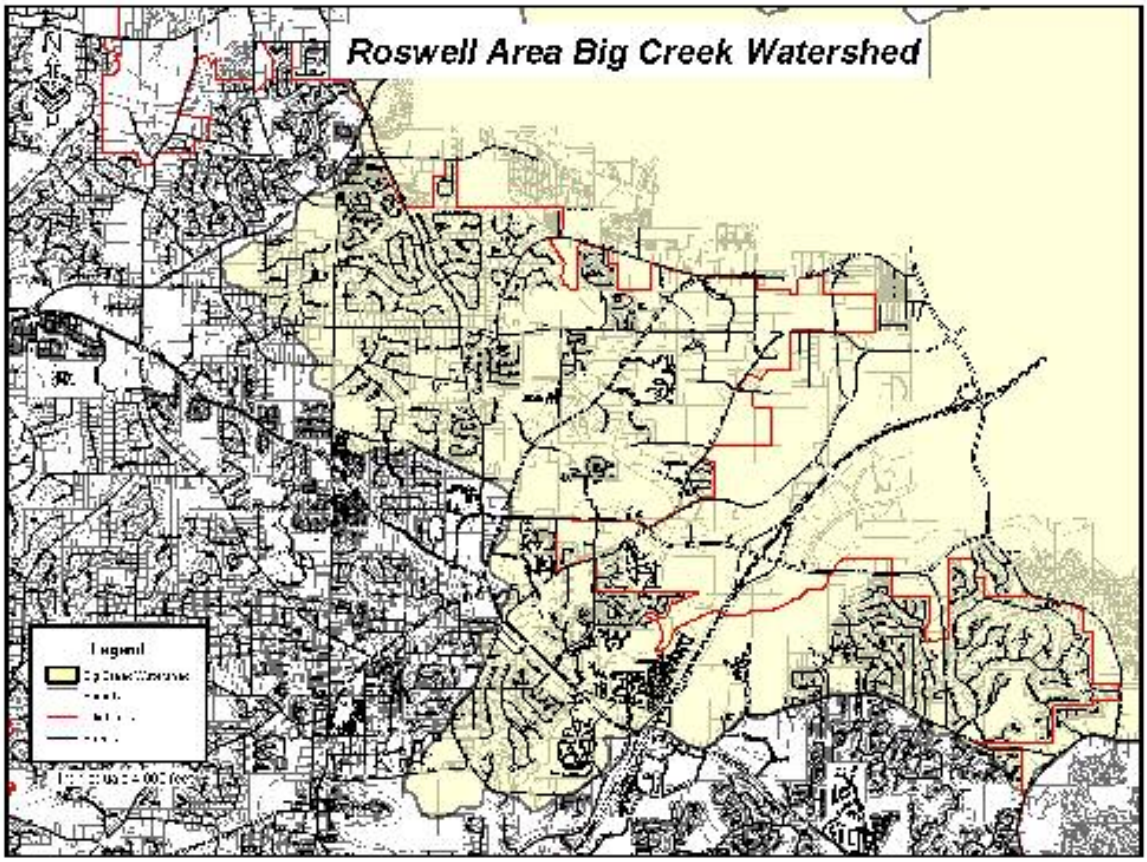
The Big Creek Water Supply Watershed (Map 5.1) encompasses approximately 99 square miles in Roswell, Alpharetta, unincorporated Fulton County, unincorporated Forsyth County, Cumming, and unincorporated Cherokee County. Roswell's geographic share of the entire water supply watershed is approximately 6,418 acres (10.11 percent of the total water supply watershed). (See Map 5.2; the shaded portion shows the watershed). The water supply watershed includes the following streams: Big Creek, Foe Killer Creek, Long Indian Creek, Camp Creek, Bentley Creek, Cheatham Creek, and Kelly Mill Creek. Only the first two creeks are in Roswell.



Map 5.1
Big Creek Watershed

Standards Applicable to Roswell's Portion of the Watershed

The specific standards to be applied depend on the distance from the water intake. For perennial streams within a seven-mile radius upstream of the water supply intake (see accompanying figure), a 100-foot wide buffer is required on both sides of the stream, impervious surfaces are not allowed within 150 feet of both sides of the stream, and septic tanks and septic tank drainfields are prohibited within 150 feet of the stream. Outside a seven-mile radius upstream of the water supply intake (which does not apply to Roswell), the buffer and impervious surface setbacks are 50 feet and 75 feet, respectively. In addition to the buffer and impervious surface setback requirements, regardless of distance from the water intake, hazardous waste treatment and disposal facilities are prohibited, sanitary landfills must have synthetic liners and leachate collection systems, and facilities handling hazardous materials must perform operations on impermeable surfaces having spill and leak collection systems. Roswell began implementation of the "Part V" (as in "Five") standards in 1997, via an amendment to the City's Zoning Ordinance. These requirements were recodified as Chapter 21.3, "Tributary Protection," in the revised Zoning Ordinance adopted in April 2003.



Map 5.2
Big Creek Watershed, Roswell

Big Creek Water Supply Watershed Study Master Plan

After many years, the Atlanta Regional Commission published a 312-page Big Creek Watershed Study Master Plan. The Big Creek Study was a cooperative effort among the affected jurisdictions and sponsored by the Atlanta Regional Commission.

The entire watershed is expected to increase from 15 percent impervious in 1995 to 35 percent impervious in 2020. If this projection holds true, the Big Creek small water supply watershed will exceed the 25 percent impervious standard established by the Georgia Department of Natural Resources (DNR) in its Rules for Environmental Planning Criteria. Those rules, however, provide that an alternative standard may be approved by DNR, and the Big Creek Study was based on the premise that an alternative standard for protection would need to be developed. The Big Creek Initiative, a consortium of the six governments in the watershed, is working on the alternative standard at the time of this writing.

The Big Creek Watershed will urbanize almost completely (86% developed) by the year 2020. As of the year 2000, it was 45 percent developed. All of the streams in the Big Creek Watershed are impaired by sediment and are impacted by urbanization.

The study recommends Best Management Practices (BMPs) (see Table 5.1 for representative examples) throughout the entire undeveloped portion of the watershed, along with other watershed management policies and programs. Scenario "7", the application of source and treatment controls throughout the undeveloped area of the basin, was found in the Master Plan to provide the best opportunity to achieve water quantity, water quality, and community goals.

Table 5.1
Best Management Practices for Water Pollution Control

Type of Practice	Best Management Practices
Source Control	• Public education • Planning management • Material use, exposure, and disposal controls • Spill prevention and cleanup • Illegal dumping and illicit connections • Street and storm drain maintenance
Treatment Control, Site Level	• Biofilters (vegetated swales/strips) • Infiltration • Media filtration • Water quality inlets
Treatment Control, Community Level	• Infiltration • Wet ponds • Constructed wetlands • Extended detention basin • Multiple system

Source: Camp Dresser & McKee 1999a.

Roswell's Implementation Efforts

Since 2000, Roswell has implemented strict watershed protection regulations. In fact, Roswell's regulations implement impervious surface limitations, buffers, and setbacks from streams on a citywide basis, not just in the Big Creek Water Supply Watershed (see Chapter 21.3, "Tributary Protection," and Chapter 21.1, "Watershed Protection," of the City of Roswell's Zoning Ordinance). There are a number of additional considerations that go into watershed protection, the implementation of which is ongoing (see Table 5.2).

Table 5.2
A Menu of Land Development Provisions to Protect Water Quality

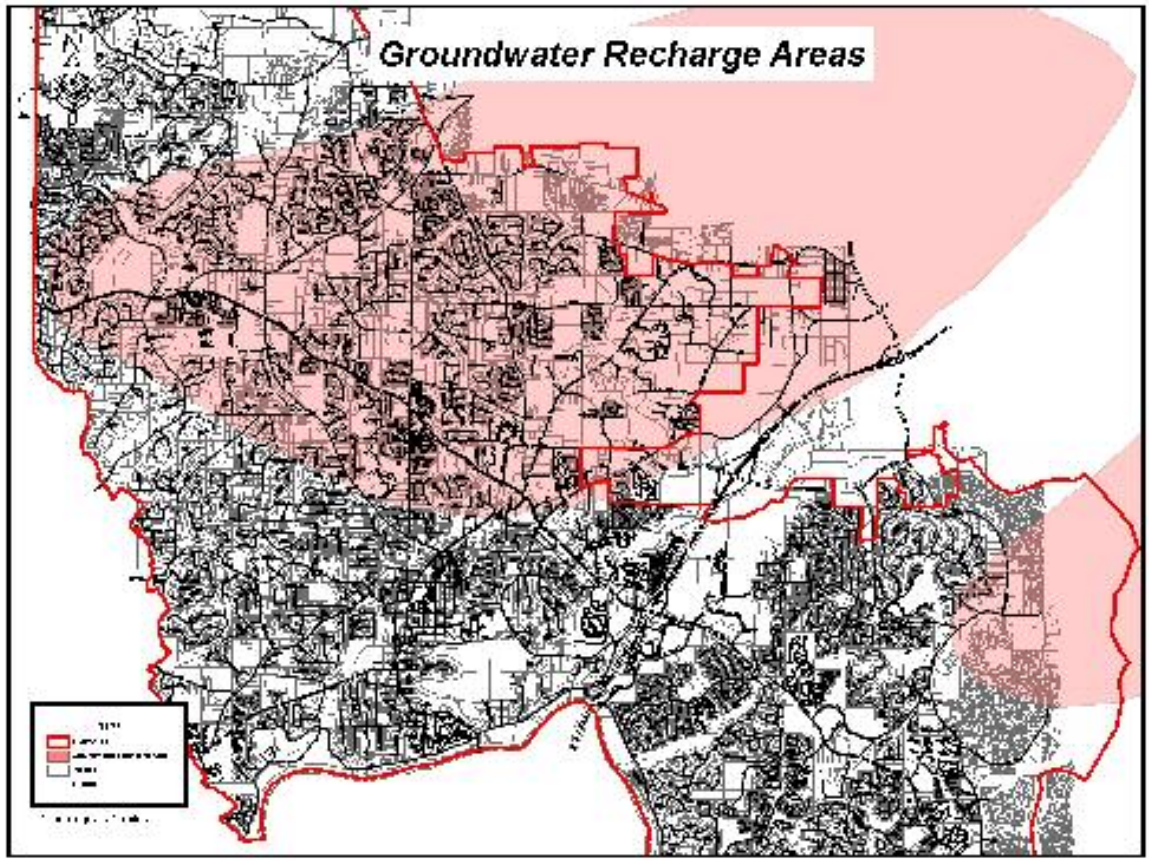
Provision	Purposes and Benefits of Implementation				
	Increase Infiltration/ Reduce Runoff	Reduce Development Costs	Reduce Auto Use and/or Pollution	Treatment or Filtering	Preserve Existing Vegetation
Density [1]	X	X			X
Stream buffers	X			X	X
Limit impervious cover	X	X			X
Mixed land uses		X	X		
Paths for walking/biking			X		
Infill development policies		X	X		X
Narrower street widths	X	X			X
Limit cul-de-sac radii	X	X			X
Reduce parking minimums	X	X			X
Use pervious pavements where appropriate	X				
Use vegetated swales		X		X	X
Swale biofiltration velocity control	X			X	
Treatment at "hot spots"				X	
Inlet labeling				X	
Limit clearing and grading	X	X			X

Source: Derived from University of Georgia School of Environmental Design, 1997.

GROUNDWATER RECHARGE AREAS

State planning standards require that the City's Comprehensive Plan include groundwater recharge areas as defined and provided for in the Rules for Environmental Planning Criteria. The state's environmental planning criteria define a "recharge area" as a portion of the earth's surface where water infiltrates into the ground to replenish an aquifer. "Significant recharge areas" are also defined in the rules based on outcrop area, lithology, soil type and thickness, slope, density of lithologic contacts, geologic structure, the presence of karst, and potentiometric surfaces. In the Piedmont, the significant recharge areas are those with thick soils and slopes of less than eight percent. The Georgia Department of Natural Resources (DNR) has produced a map titled "Hydrologic Atlas 18," that shows significant groundwater recharge areas in the state.

[1] Regulation on the basis of units per acre rather than a minimum lot size.



Map 5.3
Groundwater Recharge Areas in Roswell Area

There is a large significant groundwater recharge area within Roswell. Generally, that area lies north of Crossville Road and Holcomb Bridge Road, west of Georgia 400 (see Map 5.3, which shows two groundwater recharge areas in the Roswell area). The groundwater recharge area includes most of the Brookfield West subdivision in northwest Roswell, and the northern boundary follows generally Rucker Road. It is classified according to Hydrologic Atlas 18 as "low" pollution susceptibility. In addition, the southernmost boundary of another significant groundwater recharge area lies just east of the Roswell city limits (north and south of Old Alabama Road, east of Nesbit Ferry Road), in unincorporated Fulton County.

The Criteria for Protection of Groundwater Recharge Areas require the following for significant groundwater recharge areas with low pollution susceptibility:

- New sanitary landfills will not receive permits from DNR unless they have synthetic liners and leachate collection systems.

- New permits for the land disposal of hazardous wastes will not be issued by DNR.

- Facilities that are permitted to treat, store, handle, or dispose of hazardous waste must perform their operations on an impermeable surface pad having a spill and leak collection system as prescribed by DNR.

- New above-ground chemical or petroleum storage tanks, having a minimum volume of 660 gallons, must have secondary containment for 110 percent of the volume of such tanks or 110 percent of the volume of the largest tank in a cluster of tanks.

- New agricultural waste impoundment sites exceeding 50 acre-feet[2] must have clay liners meeting certain specifications.

- New homes and mobile home parks served by septic tank drain fields shall be on lots having 110 percent of the subdivision minimum lot or space size identified in Table MT-1 and MT-2, respectively, of the Georgia Department of Human Resources' (DHR's) Manual for On-Site Sewage Management Systems; however, the local government can exempt development on lots of record. (Note: Table MT-1 prescribes minimum lot sizes based on slope class and soil grouping; minimum lot sizes range from 30,000 to 66,000 square feet). If the City requires a larger lot size than required by the DHR, then the large lot size applies.

Roswell began implementation of the "Part V" standards in 1997, via an amendment to the City's Zoning Ordinance. The protection criteria for groundwater recharge areas are now codified as Chapter 21.2 of the Roswell Zoning Ordinance. By and large, these standards have not come into play because the City's minimum lot sizes in unsewered areas are larger than the minimum lot sizes required by the Part V standards. Furthermore, the uses potentially dangerous to groundwater quality are excluded by the City's Zoning Ordinance.

WETLANDS

Wetlands (see Map 5.4) are areas that are flooded or saturated by surface or groundwater often and long enough to grow vegetation adapted for life in water-saturated soil. A wetland does not have to be flooded or saturated for more than one week of the year in order to develop the vegetation and soil characteristics that qualify it as a wetland (Georgia Department of Community Affairs n.d.). Wetlands generally include swamps, marshes, bogs, and similar areas.

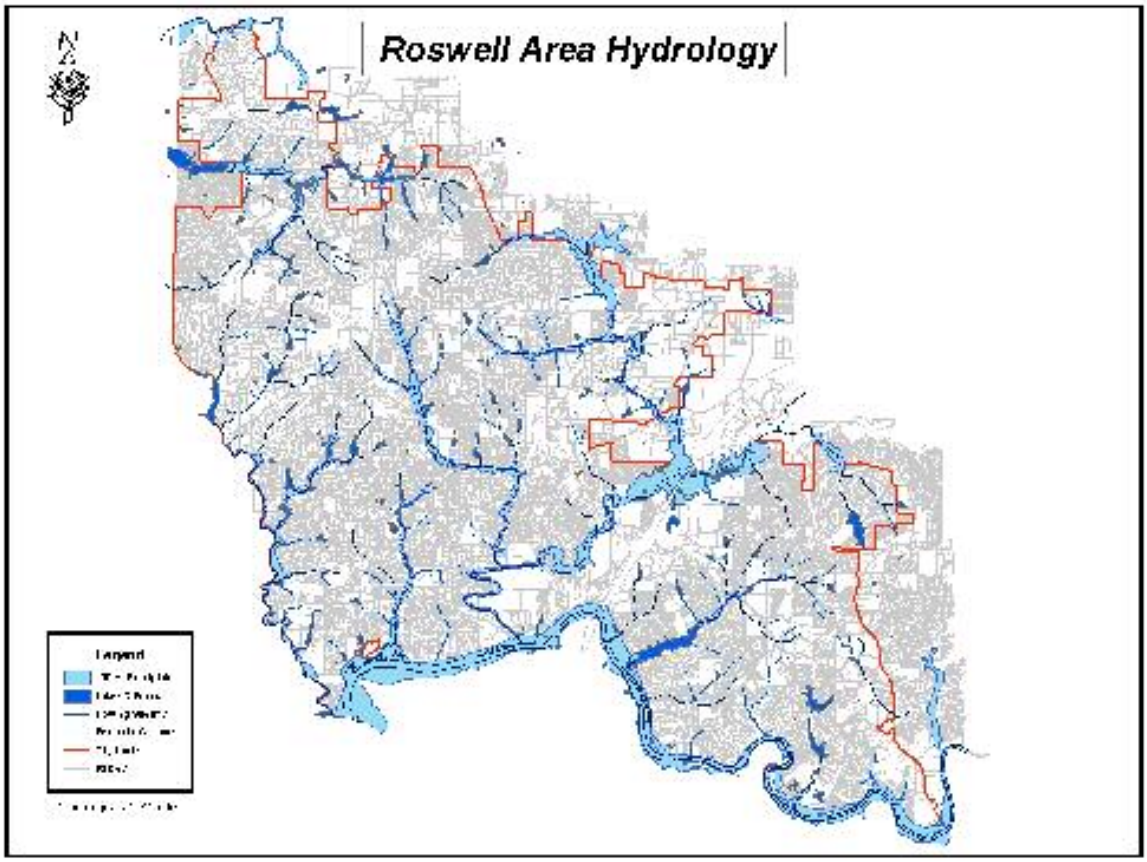
Local governments are required by the environmental planning criteria to acknowledge the importance of wetlands for the public good in the land use planning process. Wetlands are also required to be appropriately identified and mapped in local land use plans (Ga. DNR Rule 391-3-16-.03). Nearly all of Roswell's wetlands are small areas within or adjacent to streams.

Beyond these two requirements, the DNR rules are somewhat ambiguous with regard to local land use plans and regulations. The rules indicate that land use plans should address eight considerations with regard to wetlands. It appears that the intent of the rules is to consider various impacts when the alteration of wetlands is proposed as part of the land use planning or development process. Accordingly, the eight considerations are included in the City's policies that apply in the case where the City evaluates a proposal to disturb a wetland. The only

[2] This is a technical term used in the Rules for Environmental Planning Criteria. It is defined by a dictionary as "the volume (as of irrigation water) that would cover one acre to a depth of one foot."

ordinance requirement suggested by the Georgia Department of Community Affairs (n.d.) relative to wetlands is that local permits should not be issued for projects that appear to contain wetlands until the Corps of Engineers has determined whether the wetlands are jurisdictional, in which case a Section 404 permit must be obtained prior to the issuance of a local permit.

Roswell began implementation of these standards in 1997, via an amendment to the City's Zoning Ordinance. Wetland regulations are codified as Chapter 21.3 of Roswell's Zoning Ordinance. The most significant wetlands in Roswell are located adjacent to the Chattahoochee River south of Willeo Road and Azalea Drive, and along Big Creek just east of Georgia 400.



Map 5.4
Hydrology, Roswell Area

Importance of Wetlands

Wetlands serve many functions and have a number of values. Wetlands temporarily store flood waters, thereby preventing flood damage, and they can also protect lands from erosion by reducing the velocity of water currents. They serve as pollution filters by helping to remove sediment, absorb chemicals and nutrients, and produce oxygen. Wetlands have important environmental values including improving water quality by intercepting stormwater runoff, preventing eutrophication of natural waters, and supporting delicate aquatic ecosystems

(nutrient retention and removal, food chain support, migratory waterfowl usage, providing other wildlife habitat, etc.). Many wetlands are areas of groundwater recharge, and they also can provide a source of recreation (hunting and fishing), aesthetics, and scientific research (Kundell and Woolf 1986).

Federal Regulation of Wetlands

The United States Army Corps of Engineers' Section 404 permitting process governs the discharge of fill material into wetlands and other water bodies. Under Section 404 of the Clean Water Act (33 U.S.C. 1344), the Corps of Engineers is authorized to issue individual and general permits. For permits to be issued, they must be consistent with the U.S. Environmental Protection Agency's guidelines, which include limitations on the issuance of permits if there is a "practicable alternative" or if adverse effects would occur on the aquatic ecosystem. EPA can veto a proposed Corps 404 permit if unacceptable adverse effects would occur on water supply or natural areas (Stokes 1990).

Big Creek Park Wetlands Enhancement Demonstration Project

The City-owned Big Creek Park is located along Big Creek, approximately two miles north of where Big Creek joins the Chattahoochee River (east of State Route 400). The master plan for the park includes approximately 30 acres of property that has been selected for a Wetlands Enhancement Demonstration Project. It is intended to demonstrate improvements on the overall quality of an urban watershed and wetlands system through the use of innovative approaches to manage both the quality and quantity of urban stormwater runoff. Project objectives include the following:

- Demonstrate urban stormwater "best management practices" for improving water quality.
- Demonstrate groundwater recharge through the wetlands to improve low-flow conditions in Big Creek during drought periods.
- Demonstrate wetlands enhancement such as improved wetland hydrology and habitat diversity.
- Construct a network of trails for public use with the ability to provide public education pertaining to water quality, wetlands, and stormwater management. The greenway trail will connect with Alpharetta's Big Creek Greenway.

Construction began in Fall 2004. Monitoring will take place for four years after construction and results will be reported to the U.S. Environmental Protection Agency.

PROTECTED RIPARIAN CORRIDORS

Metropolitan River Protection Act

The Metropolitan River Protection Act (MRPA), adopted in 1973 and amended in 1998, designates a corridor of land that extends 2,000 feet from the banks of the Chattahoochee River, from Buford Dam to the downstream limits of Fulton and Douglas counties, as an area requiring special protection.

Segments of rivers covered by the Metropolitan River Protection Act are specifically excluded from the definition of "protected river" as provided in the Rules for Environmental Planning Criteria. This means that the Chattahoochee River in Roswell is regulated under the

Metropolitan River Protection Act (O.C.G.A. 12-5-440 through 12-5-457) rather than the Environmental Planning Criteria for Protected River Corridors.

Chattahoochee River Tributary Protection

In 1984, pursuant to requirements of the Metropolitan River Protection Act, the Roswell Mayor and City Council adopted a Chattahoochee Tributary Map, which identifies "first class" and "second class" streams flowing within the City, and regulations pertaining to the protection of those streams. First class stream boundaries correspond with all lands shown as "zone A" on federal flood insurance rate maps, while second class stream boundaries include other stream channels and adjacent young alluvium soil types. Land disturbing activity within tributary protection areas is strictly regulated by Chapter 21.3, "Tributary Protection," in the revised zoning ordinance adopted in April 2003.

Chattahoochee River Corridor Plan and Regulations

Development within the river corridor is guided by development standards adopted by the Atlanta Regional Commission as the "Chattahoochee Corridor Plan." That plan enunciates seven goals and nine policies for public and private development within the river corridor. These goals and policies are hereby incorporated into the Roswell Comprehensive Plan 2025.

A key aspect of the river corridor protection plan is the mapping and regulation of "land vulnerability categories." In 1972, as part of the Chattahoochee Corridor Study, the Atlanta Regional Commission mapped the entire corridor as lying within one of these categories. The vulnerability maps were readopted in 1998. Land disturbance and impervious surface are regulated within the corridor according to regulations summarized in Table 5.3.

Table 5.3
Vulnerability Categories and Development Regulations
Applicable in the Chattahoochee River Corridor

Vulnerability Category	Percent Maximum Land Disturbance	Percent Maximum Impervious Surface
A	90	75
B	80	60
C	70	45
D	50	30
E	30	15
F	10	2

Source: Atlanta Regional Commission. September 23, 1998. Chattahoochee Corridor Plan.

The Chattahoochee Corridor Plan also establishes flood plain and buffer zone standards. The Atlanta Regional Commission readopted rules and regulations in 1998 that establish procedures and additional standards for development within the river corridor. MRPA gives local governments in the corridor the responsibility to implement the plan by reviewing and permitting development projects within the corridor, to monitor land-disturbing activities in the corridor, and to enforce restrictions in accordance with MRPA and the Plan (Atlanta Regional Commission 1992).

The Atlanta Regional Commission studied riverfront conditions in 1988 to determine the level of compliance with buffer zone standards established in the Chattahoochee Corridor Plan. It indicates that Roswell has about 4.7 miles of river frontage. Almost all of the development examined in that study was found to exist prior to the Metropolitan River Protection Act or prior to when review procedures for consistency with MRPA were established.

FLOOD PLAINS

Flood plains have been mapped by the Federal Emergency Management Agency. Flood plains also are shown on maps available in the Community Development Department (for general locations, see Map 5.4 in this Natural Resources Element). Flood plains are generally represented as parks, recreation, and conservation in the future land use plan. Flood plains exist along the Chattahoochee River, Big Creek, Foe Killer Creek, Willeo Creek, Pine Grove Branch, Pine Grove Creek, Riverside Creek, Hogwaller Creek, Crossville Branch, Crossville Creek, Hughes Branch, Strickland Creek, and Seven Branch.

SOIL TYPES

Soils provide a variety of functions and affect septic tank usage and construction of public utilities. Development without regard to the properties of soils can lead to wet basements, cracked foundations, flooding, damage to underground utilities, land slides, and erosion problems. The soils in Roswell include Congaree-Chewacla-Wickham, which are found along Big Creek and have major limitations on development, and Lloyd-Cecil-Madison, which are well-drained, have few limitations, and occur on rolling and hilly uplands (Cooper Ross 1996). The majority of the soils in Roswell have minor limitations such as susceptibility to moderate erosion and drainage problems (Presnell-Kidd Associates 1979). The importance of soils with regard to on-site septic systems has diminished somewhat in Roswell over time, because the vast majority of development is served by sanitary sewer.

PHYSIOGRAPHY, TOPOGRAPHY AND STEEP SLOPES

The physiography of an area contributes to the visual character and variety of the landscape, and it has great influence on natural drainage patterns, stormwater runoff velocity, and soil erosion (Presnell-Kidd Associates 1979). Roswell is located within the Piedmont physiographic province of the southeastern United States. The western half of North Fulton County lies within the Central Upland District, which is characterized by a series of low, linear ridges separated by broad, open valleys. The eastern half of North Fulton County lies within the Gainesville Ridges District, which is a series of northeast-trending, low, linear, parallel ridges separated by narrow valleys (Brown and Caldwell 1999; Georgia Department of Natural Resources 1976).

Topography is generally rolling to hilly. Elevations in North Fulton County range from 1200 feet above mean sea level in the upper portion to 860 feet at the Chattahoochee River. Areas with the most severe slopes are situated along the banks of the Chattahoochee River and various streams that feed into the river.

Roswell passed an ordinance that requires submittal of a Steep Slope and Erodible Soils Evaluation for all land disturbing activities on any slope (or any fill) in excess of 25 percent within 500 feet of any state waters or stream identified on the Water Resources Protection Map, latest version. The evaluation must provide a score for slope, slope length, soil erodibility, vegetative cover, and sediment delivery. If a segment of a subdrainage area has a total score of thirty-five (35) or greater it must be designated as a buffer and no development shall be

approved in that segment. Segments with total scores of twenty-five (25) or thirty (30) require the application of additional protection measures.

PRIME AGRICULTURAL AND FOREST LAND

Minimum planning standards require that the City identify areas valued for agricultural or forestry production that may warrant special management practices. Hardwood trees, such as oak and hickory, are found along streams, ravines, and slopes of the Chattahoochee River (also see later subsection on trees indigenous to the region). However, pine tree stands are more common (Presnell-Kidd Associates 1979). Farmland is increasingly scarce if not nonexistent as of the year 2005; some farmland may still exist in scattered locations in northwest Roswell. Therefore, the Comprehensive Plan does not call for special protective measures to protect agricultural and forest lands.

However, some attention is given to policies (including tree protection) that encourage maintenance of the urban forest, which is an ecosystem that consists of all trees, associated vegetation, animal life, and other natural resources in an urban area. The urban forest ecosystem exists along streets, in open green spaces, as undeveloped forested areas, in parks and on other public, private and commercial properties. Urban forestry is the management of that ecosystem. To respond to these concerns, the City adopted a Master Tree Planting Plan on November 15, 2004.

In 2002, American Forests conducted an assessment of the tree cover for the City of Roswell, covering 25,000 acres.[3] The project resulted in production of a land cover classification data layer using Geographic Information Systems (GIS) technology. CITYgreen® software was used to calculate the environmental and economic values of Roswell's urban forest. The analysis revealed that the tree cover overall is currently (2002) at 45 percent, higher than most U.S. cities east of the Mississippi River.

Ten sample sites were used to calculate the environmental and economic values of Roswell's urban forest. The assessment found that Roswell's urban forest provides ecological benefits which include slowing storm-water runoff, mitigating air pollution and reducing residential energy consumption. Significant additional facts and findings of the assessment are summarized below.

- Without the total stormwater retention capacity of Roswell's urban forest, the cost of building the infrastructure to handle the increase in stormwater runoff would be approximately $144 million (based on construction costs of $2 per cubic foot).

- The value of the urban forest in terms of removing nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, and particulate matter of 10 microns or less is $2.7 billion annually.

- Tree shading reduces air conditioning use of Roswell's single-family homes at an annual savings of $8.58 million.

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[3] *Regional Ecosystem Analysis, Roswell, Georgia: Calculating the Value of Nature*. August 2002. Washington, DC: American Forests.

In addition to quantifying the impacts of Roswell's urban forest, the "green data layer" can be used in decision-making processes, thus adding a new dimension to planning and development discussions.

The assessment recommends that a balance be achieved between the natural and the built landscape to take full advantage of the ecological benefits of tree cover. The goals recommended by American Forests (2002) include:

- 40 percent tree canopy overall.
- 50 percent tree canopy in suburban residential.
- 25 percent tree canopy in urban residential
- 15 percent tree canopy in central business districts.

PLANT AND ANIMAL HABITATS

Rare and Important Species

Table 5.4 indicates plant and animal species native to North Fulton County that are or may become endangered.

Table 5.4
Important Plant and Animal Species, North Fulton County

Type of Species	Name	Status
Plant	Piedmont barren strawberry	Not legally protected
Plant	Pink lady's slipper	State protected species
Plant	Yellow lady's slipper	State protected species
Plant	False hellebore	State protected species
Plant	Bar star-vine	State protected species
Animal	Red-Cockaded woodpecker	Endangered species
Animal	Bald eagle	State protected species
Animal	Indiana bat	Endangered species
Animal	Bachman's sparrow	Not legally protected

Source: U.S. Department of the Interior, Fish and Wildlife Service, Division of Ecological Services, Brunswick, Georgia, June 1991. As reported in Cooper Ross 1996.

The Pink Lady's-Slipper, also known as the Moccasin Flower, is a showy plant with hairy basal leaves and a capsule fruit. It is most frequently found in acid soils on pinelands, and occasionally on the edges of Rhododendron thickets and rarely in bogs. The Yellow Lady's-Slipper, also known as the Golden Slipper, is a showy plant with a yellow-colored lip petal and a capsule fruit. It is found mostly in rich, moist, hardwood coves and forests (Georgia Department of Natural Resources, n.d.). In the past, researchers at the University of Georgia and the Chattahoochee Nature Center have engaged in the cultivation of rare plants and returned them to their original landscape (Seabrook 1990).

The Indiana Bat (Myotis Sodalis) is a nocturnal insectivore with a fine and fluffy, dark gray fur. Its preferred habitat is caves with moderately cool temperatures and high humidity. The Red-Cockaded Woodpecker is an endangered species that feeds in the upper regions of large pines and nests in over-mature pines. The Southern Bald Eagle is a bird of inland waterways and

estuarine systems. It requires wetland areas for hunting and has declined in population due to habitat destruction (Georgia Department of Natural Resources 1977).

The Georgia Natural Heritage Program Database System (GNHPDS) contains information on the location of rare animals, plants and natural communities in Georgia to the precision of one quarter of a USGS 7.5 minute quadrangle map (quarter quad). Species known to exist in Roswell are shown in Table 5.5.

The Chattahoochee River in Roswell is a trout fishery. It is stocked with hatchery-reared trout to help meet the demand for fishing.

Table 5.5
Rare Animals, Plants and Natural Communities in Roswell

Species	Common Name	State Status	Habitat in Georgia	Location in Roswell (quarter of quadrangle map)
Schisandra glabra	Bay Starvine	Threatened	Stream terraces	SE Roswell
Waldsteinia lobata	Piedmont Barren Strawberry	Threatened	Stream terraces and adjacent gneiss outcrops	SE Roswell
Cyprinella callitaenia	Bluestripe Shiner	Threatened	Brownwater streams	SW Roswell
Lampsilis subangulata	Shiny-rayed Pocketbook	Endangered	Sandy/rocky medium-sized rivers & creeks	SW Roswell
Notropis hypsilepis	Highscale Shiner	Threatened	Blackwater & brownwater streams	SW Roswell
Rhus michauxii	Dwarf Sumac	Endangered	Open forests over ultramafic rock	SE Roswell; NE, SE, SW Mountain Park

Source: Georgia Natural Heritage Program Database System. Element Occurrences by Quarter Quad. Georgia Natural Heritage Program, Nongame Wildlife and Heritage Section, Social Circle, GA. December 1999.

Significant Habitat Areas

Fulton County's Department of Planning and Economic Development (now Environment and Community Development) identified three ecologically significant wildlife habitats that are now within the city limits of Roswell. First, the Chattahoochee River Park (south of Willeo and Azalea roads) contains freshwater wetland plants such as cattails, alders, cottonwoods, willows, and many show annual flowering herbs. Wildlife in this area includes beaver, waterfowl, frogs, and fish. Second, the area between Lackey Road and the Cherokee County line, which is now developed in part as the "Litchfield Hundred" subdivision, contains a forest of oak, beech, sycamore, elm and poplar to 20 inches in diameter within a narrow, steep hillside with a north-facing slope. Rare understory herbs and plants typical of climates farther north are found in this area. Third, an area east and west of Mountain Park Road (mostly developed as the "Brookfield West" and "Wildwood Springs" subdivisions, respectively) contains oak trees 40 inches in diameter growing alongside 20 inch diameter poplar, pine, sycamore and beech trees. Wildlife in this area includes turtles, toads, opossum, and raccoon (Fulton County Department of Planning and Economic Development 1988).

Etowah Habitat Conservation Plan

Rocky Creek and Little River, in northwest Roswell, are tributaries of the Etowah River. The City of Roswell has been a charter participant in the development of the Etowah River Habitat Conservation Plan (HCP). This plan, under the guidance of the University of Georgia, Institute of Ecology, will establish goals and priorities for protection of wildlife habitat in the basin, as well as regulations for adoption by member governments.

Habitat Protection Planning

There are many ways that urban development affects the natural ecosystem that were, until recently, not well articulated. For instance, once an individual parcel or subdivision becomes bounded with walls and/or fences, that parcel ceases to be "an indistinct piece of a whole to being an independent element." Nature does not need the boundaries that we draw and the walls that we build (Freyfogle 1998). Disturbing the soil on one property may increase the chance that exotic plants may grow there and eventually invade other portions of the site and beyond.

Even a recreational trail creates small-scale disturbances that allow access to exotic plants that otherwise may not have been able to enter an area. Zoning boundaries and boundaries between developments create distinct ecological boundary zones that can filter, block, or concentrate the movement of animals, seeds, wind, water, and nutrients, thereby isolating areas from one another and resulting in long-term and far-reaching ecological impacts on lands abutting the boundary (Landres et al. 1998).

Landscape ecology, which analyzes how plants and animals are spatially distributed and move through land mosaics, has emerged in the past decade to be usable to practicing land use planners. Descriptions of key terms and principles of landscape ecology are provided in Table 5.6.

Although the City of Roswell has few large areas of prime wildlife habitat (the Big Creek Unit of the Chattahoochee River National Recreation Area being one major exception), the principles of landscape ecology can apply to land use planning and environmental protection in suburban environments such as Roswell. Plan policies support the review of developments for their impact on wildlife habitats.

Table 5.6
Terms and Principles of Landscape Ecology

Term	Description and Principles
Patch	An area, whether consisting of vegetation, pasture, disturbed area, or resource (e.g., wetland), that exhibits a degree of isolation. Patches may be as small as a single tree. A large patch is likely to have more habitats present, and therefore contain a greater number of species than a small patch. Removal of even small patches can cause habitat loss, reduce the population size of certain species, and reduce habitat diversity.
Edge	The outer portion of a patch where the environment differs significantly from the interior of the patch. Higher proportions of edge habitats (i.e., such as in the division of a patch) give rise to a greater number of edge species and a reduction in the number of interior species. Shapes of patches can be manipulated to accomplish ecological function or objective. Edges act as filters that dampen influences of the surroundings on the patch interior. Most natural edges are curvilinear, complex, and soft (unlike most man-made edges that are straight, simple, and hard). The presence of coves and lobes along an edge provides greater habitat diversity. Circular edges tend to increase the numbers of interior species. The ecologically optimum is one that is "spaceship" shaped, with a rounded core, plus some curvilinear boundaries and "fingers" for species dispersal.
Corridors	Stream or river systems are corridors of exceptional significance. Corridors may also act as barriers or filters to species movement (e.g., roads, power lines, and trails). A row of "stepping stones" (small patches) is not as good for species movement as a corridor, but it is better than no corridor at all.
Connectivity	Providing higher quality linkages between habitat patches results in strong positive net benefits for enhancing biodiversity.

Source: Dramstad, Olson, and Forman 1996.

MAJOR PARK, RECREATION AND CONSERVATION AREAS

In an effort to protect the Chattahoochee River and provide for recreation, Congress in 1978 established the Chattahoochee River National Recreational Area. This area serves as a series of parks that dot the river and provide recreation opportunities for metropolitan Atlanta residents (Atlanta Regional Commission 1992).

Vickery Creek Unit

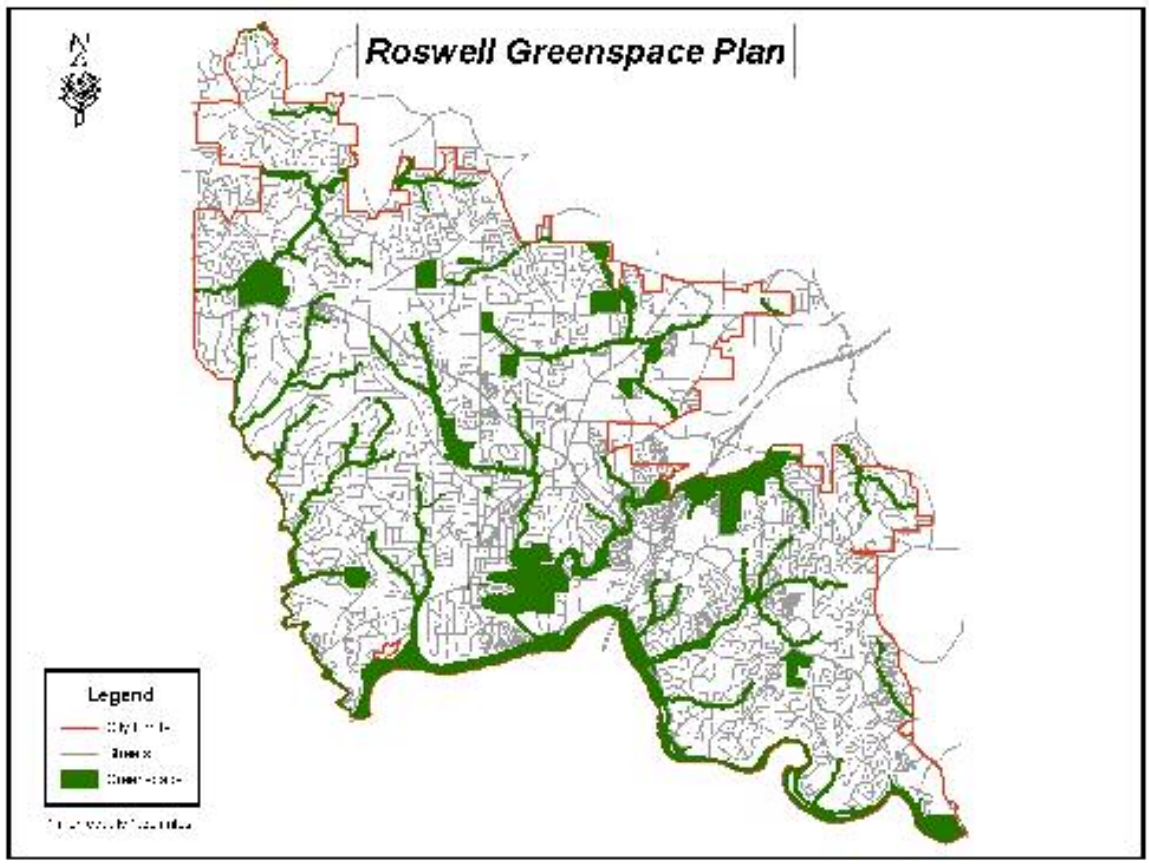
The Vickery Creek Unit of the Chattahoochee River National Recreation Area is located within the city limits of Roswell. That area consists of approximately 280 acres and includes forests, Civil War trenches, and Cherokee Indian grounds adjacent to Vickery or Big Creek. This area is managed by the superintendent of the Chattahoochee River National Recreation Area, United States National Park Service. The City has had an active cooperative relationship with the National Park Service with regard to planning for recreation facilities.

Chattahoochee River Park

Most of the Chattahoochee River fronting along Willeo Road and Azalea Drive between Willeo Creek and Atlanta Street is in the Chattahoochee River Park, which is administered by the United States National Park Service, Fulton County and the City of Roswell. The riverfront in this area contains a number of shallow inlets, marshes, and other wetlands that form one of the upper reaches of the Bull Sluice Lake impoundment. The Chattahoochee Nature Center includes a system of boardwalks and open pavilions that provide access to the Nature Center's wetlands and riverfront (Atlanta Regional Commission 1988).

GREENSPACE PROGRAM

Roswell has made a commitment to permanently protect 5,000 acres of greenspace and has made efforts to attain a goal of providing 20 percent of the City's geographic area as greenspace (see Map 5.5., Roswell Greenspace Plan).



Map 5.5
Roswell Greenspace Plan

SCENIC VIEWS AND SITES

Minimum Planning Standards require that the Natural Resources Element include significant visual landmarks and vistas that may warrant special management practices. Significant natural features include the Big Creek Gorge, the Chattahoochee River, the Piedmont ridgeline and tree cover along the Chattahoochee River, and rolling wooded areas in the northwest sections of Roswell. Other scenic resources include the view of Sweat Mountain from Woodstock Road, the Chattahoochee River backwater along Willeo Road and Azalea Drive, and the view to the north of Grimes Bridge Road. The visual and aesthetic character of Roswell fulfills a vital function by attracting new, high quality development and providing positive psychological values for both residents and visitors (Presnell-Kidd Associates 1979).

CONSERVATION RESOURCES AND PROGRAMS

Two key resources in Roswell are the Roswell Urban Forest Foundation and the Chattahoochee Nature Center. A number of conservation programs were described in the 2020 Comprehensive Plan. That detailed listing is omitted here in favor of a summary description of key programs that might be relevant to Roswell during the planning horizon.

Georgia Urban Forest Council

The Georgia Urban Forest Council, headquartered in Macon, works in conjunction with the Georgia Forestry Commission to improve urban forestry programs throughout the state. The Council provides education, technical support, leadership and policy development in order to improve the quality of life in urban areas. The Council is involved in projects such as the following: Landmark and Historic Tree Program; Urban and Community Forestry Assistance Grant Program; Arborist Certification; Project Learning Tree; tree protection and land development ordinances; increasing the availability of desirable trees for the public; Georgia's Annual Urban Forestry Conference; and the Annual Urban Forestry Awards Program.

Tree City USA

Tree City USA recognition can contribute to a community's pride. Tree City USA can serve as a blueprint for planting and maintaining the community's trees. Roswell has been a "Tree City USA" since the early 1990s. To become a Tree City USA, a City must have: a tree board charged by ordinance to develop and administer a comprehensive city tree management program; a city tree ordinance; a community forestry program with an annual budget of at least $2 per capita; and the City must issue a proclamation declaring the observance of Arbor Day in the City, and sponsor an Arbor Day celebration. The City's arborist works to maintain the City's Tree City USA certification.

The Trust for Public Land

The Trust for Public Land, Southeast Region, is working to protect the Chattahoochee River, which is considered by some to be the most endangered urban river in America. The Trust has launched the Chattahoochee River Land Protection Campaign to protect natural lands along the river from North Georgia to Columbus - helping restore the quality of drinking water while providing a major new recreational resource for metro Atlanta (Trust for Public Land 1999). Roswell has worked with the Trust to help fund and acquire a continuous greenway which protects five miles of natural lands along the Chattahoochee River.

GOALS AND POLICIES

Citywide Environmental Strategies

1. Limit development to a level that does not exceed the capabilities and requirements of a healthy environment.

2. Limit development in environmentally sensitive areas such as water supply watersheds, severe topography, and areas with drainage problems.

3. Prohibit development within flood plains.

4. Identify and maintain a system of greenspaces in the City, linked to other greenways such as Alpharetta's.

5. Maintain and improve the quality of the City's land, air, and water resources as the principal determinants of the nature and extent of development.

6. Provide permanent buffers to protect critical environmental features.

7. Use a systems approach to environmental planning.

8. Conserve and protect natural resources, including air quality, trees, natural vegetation, existing topography, streams, creeks, wetlands, watersheds, and water quality.

9. Establish 100 foot buffers on both sides of all streams and creeks and prohibit impervious surfaces within 150 feet of all streams and creeks except for development of trail systems.

10. Evaluate each proposed development's compatibility with the existing environment to determine the limitations and capabilities of the site for development.

11. Channel development into areas that are already disturbed.

12. Apply impervious surface limitations citywide.

13. Restore and enhance environmental functions damaged by prior site activities.

14. Vigorously enforce existing environmental codes.

15. Ensure that local governments follow the same environmental policies as required of private developers.

16. Acquire the most critical open space sites in the city.

17. Development should respect, and blend with, the existing topography of the land.

18. Permanently protect at least 20 percent (20%) of the City's geographic area as greenspace.

Chattahoochee Corridor Goals

The following goals were adopted by the Atlanta Regional Commission in the Chattahoochee Corridor Plan, September 23, 1998, and are incorporated by reference.

1. Preservation and protection of water quality as a principal objective.

2. Protection of recreational values. These values include scenic views, historic and other unique areas, and controlled public access and use.

3. Protection of private property rights of landowners.

4. Prevention of activities which contribute to floods and flood damage.

5. Control of erosion and siltation.

6. Control of intensity of development.

7. Location and design of land uses in such a way as to minimize the adverse impact of urban development on the Chattahoochee River (the "River") and flood plains.

Chattahoochee Corridor Policies

The following policies were adopted by the Atlanta Regional Commission in the Chattahoochee Corridor Plan, September 23, 1998, and are incorporated by reference.

1. No regional-scale public facility constructed within the Chattahoochee Corridor by or for a federal, state, or local government or agency thereof will be considered to be consistent with the Chattahoochee Corridor Plan unless it is included in the relevant regional development guide adopted or amended by the Atlanta Regional Commission pursuant to Code Section 50-8-92. Any such public facility should be designed and constructed so as to be consistent with all applicable standards in the Plan unless specifically exempted from a given standard.

2. Additional transportation crossings of the Chattahoochee River within the corridor should be minimized.

3. Any utility construction proposed should be carefully assessed to insure against physical and visual damage to the landscape. Utility easements, particularly at river crossings, should be coordinated and combined to minimize the number of additional easements and crossings needed. Areas of high scenic, historic or other unique value should not be permanently scarred.

4. Development should be fitted to the natural features of the site and may consider but not be limited to, slope, soils, drainage and vegetation, geology and aspect.

5. The location and intensity of development should be sited so as to minimize the negative effects of that development on water quality both during and after construction. Major considerations concerning water quality should include: organic pollution from infiltration

and surface runoff; erosion and sedimentation; water temperature elevation; nutrients such as nitrogen and phosphorous; and toxic materials.

6. Flood plain storage should not be decreased from its present state. Examples of flood plain land uses that are consistent with this policy are: improved or unimproved outdoor recreation; at-grade parking; agriculture, horticulture and pasture, excluding temporary or permanent buildings; fences, provided that the type, design or location will not inhibit the flow of floodwaters; public and private utility lines; roads and bridges.

7. Land and water uses within the corridor should be consistent and compatible with local government land use plans, the adopted Chattahoochee Corridor Plan, and regional development guides.

8. Projects submitted for review should not include boundary adjustments, out parcels or other strategies that have, or may have, the effect of being in conflict with the spirit and purpose of the Metropolitan River Protection Act and the Chattahoochee Corridor Plan.

9. In order for the Atlanta Regional Commission to find that a proposed land-disturbing activity, while not consistent with the Plan in all respects, will provide a level of land and water resource protection equivalent to a land-disturbing activity that is consistent with the Plan, the Commission shall consider legal, physical, biological, or hydrologic conditions within the area under review that may prevent the achievement of full consistency with the Plan. The burden shall be upon the applicant to provide that a proposed land-disturbing activity will provide a level of land and water resource protection equivalent to a land-disturbing activity that is consistent with the Plan.

Tributary Protection Policies

1. Restrict or prohibit land disturbing activities, adjacent to tributary streams, which lead to increases in erosion or to increased flood heights and velocities.

2. Control the alteration of natural flood plains, stream channels, and natural protective barriers.

3. Preserve and protect water and land resources in the Chattahoochee River Watershed by protecting fish and wildlife habitats and water quality, preventing erosion of stream banks or siltation of stream waters, and maintaining cool water temperatures and adequate food supplies.

4. Protect, conserve, and promote the orderly and efficient development of water and land resources.

Flood Plains

Utilize areas of flood plain for open space and recreational purpose, whenever possible.

Wetlands

Design around significant wetlands. Preservation is preferred over any form of destruction with mitigation. When roads must cross wetlands, they should be designed to cross at the point of minimum impact, ordinarily the narrowest point.

Establish upland buffers around retained wetlands and natural water bodies. Preserve significant uplands, too.

Any proposal for development involving the alteration of, or an impact on, wetlands should be evaluated according to the following (based on Ga. DNR Rule 391-3-16-.03):

- Whether impacts to an area would adversely affect the public health, safety, welfare, or the property of others.
- Whether the area is unique or significant in the conservation of flora and fauna including threatened, rare, or endangered species.
- Whether alteration or impacts to wetlands will adversely affect the function, including the flow or quality of water, cause erosion or shoaling, or impact navigation.
- Whether impacts or modification by a project would adversely affect fishing or recreational use of wetlands.
- Whether an alteration or impact would be temporary in nature.
- Whether the project contains significant state historical and archaeological resources, defined as "Properties On or Eligible for the National Register of Historic Places."
- Whether alteration of wetlands would have measurable adverse impacts on adjacent sensitive natural areas.
- Where wetlands have been created for mitigation purposes under Section 404 of the Clean Water Act, such wetlands shall be considered for protection.

Drainage and Erosion Control Practices

1. Minimize runoff by clustering development on the least porous soils and using infiltration devices and permeable pavements.
2. Detain runoff with open, natural drainage systems.
3. Design man-made lakes and stormwater ponds for maximum habitat value.
4. Encourage development of land in harmony with natural run-off patterns to reduce development costs, ground cover disruption and replacement, and erosion problems.
5. Reduce point and non-point pollution problems created by urban development.

Steep Slopes

Policy: Development should be restricted on steep slopes to reduce costs of soils lost to erosion, minimize landslides and water quality degradation, and reduce siltation which decreases flood storage capacities of streams and rivers.

Objective: Ensure that development as applicable complies with the Steep Slopes Ordinance, which requires steep slopes and erodible soils evaluations for selected properties with steep slopes.

Scenic Views

Policy: Preserve scenic views, where possible.

Objective: In the site development review process, consider the impact of development on known scenic views, including but not limited to, the Big Creek Gorge, the Chattahoochee River, the Piedmont ridgeline and tree cover along the Chattahoochee north to the Holcomb Bridge Road-Georgia 400 interchange, rolling wooded areas in the northwest sections of Roswell, and the view of Sweat Mountain from Woodstock Road.

Urban Forest

Whenever possible, strive to meet the following goals for retention of tree canopy:

- 40 percent tree canopy overall.
- 50 percent tree canopy in suburban residential.
- 25 percent tree canopy in urban residential
- 15 percent tree canopy in central business districts.

Trees and Landscaping Practices

1. Use reclaimed water and integrated pest management on large landscaped areas (Best Environmental Practice No. 11, adopted by the Atlanta Regional Commission 1997).

2. Use and require the use of Xeriscape landscaping.

3. Continue to promote the preservation of trees as part of the land development and construction process on nonresidential and residential properties, including maintenance of a minimum tree density.

4. Continue to prevent the indiscriminate removal of trees and reduction of canopy cover within the City.

5. Continue to prevent massive grading of land, both developed and undeveloped, without provision for replacement of trees.

6. Require the planting of street trees in subdivisions.

7. Maintain the strength of the City's Tree Preservation Ordinance by discouraging clear-cutting, requiring the preservation or planting of more hardwoods, and increasing fines for violations. Promote tree canopies along public roads in Roswell.

Wildlife Habitat Practices

1. Continue to participate in the development and implementation of the Etowah Habitat Conservation Plan.

2. Preserve patches of high-quality habitat, as large and circular as possible, feathered at the edges, and connected by wildlife corridors.

3. Maintain buffers between areas dominated by human activities and core areas of wildlife habitat.

4. Facilitate wildlife movement across areas dominated by human activities.

5. Mimic features of the natural local landscape in developed areas.

Greenspace

Implement goals and policies of the City regarding its Greenspace Program.

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